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nerve-force in certain of the ganglia in and near the substance of the heart, by which discharges the muscular walls are excited to contraction.

2. In Invertebrata, the corresponding pulsatile movements of hearts or vessels are probably independent of nerve-force.

3. The time-regulated rhythmic action, whether of the nervous centres or of the independent contractile walls, is due to their nutrition being rhythmic, *i. e.* to their being, in certain periods, by nutritive changes of composition, raised, with regulated progress, to a state of instability of composition, in their decline from which they discharge nerve-force, or change their shape, contracting.

4. The muscular substance of the heart in the Vertebrata, governed in its rhythmic action by appropriate nervous centres, has a rhythmic nutrition of its own, corresponding and coordinate with theirs; the impairments of its structure during action being repaired in repose.

5. Rhythmic nutrition is a process in accordance with the general laws of organic life, very many organic processes being composed of timely-regulated alternate action and inaction, or alternate opposite actions, *i. e.* being rhythmical, with larger or shorter units of time; and all organic processes being chronometric, *i. e.* ordered according to laws of time as exact, and only as much influenced by external conditions, as are those relating to weight, size, shape, and composition.

June 15, 1857.

The LORD WROTTESELEY, President, in the Chair.

The following gentlemen were admitted into the Society :—

The Rev. T. Romney Robinson, D.D.

Lionel Smith Beale, Esq.

George Grote, Esq.

Rowland Hill, Esq.

The Rev. Thomas Kirkman.

William Marcet, M.D.

John Marshall, M.D.

Andrew Smith, M.D.

John Welsh, Esq.

The following communications were read :—

- I. "On a new Mode of forming Triethylamine." By A. W. HOFMANN, LL.D., F.R.S. Received May 23, 1857.

Researches on the constitution of the nitrogenous organic bases, which I zealously prosecuted some years ago, and the result of which were communicated to the Royal Society, have been, by circumstances, interrupted for some time. Nearly all the observations recorded in my communications refer to the primary or amidogen-bases, *i.e.* the compound ammonias, in which 1 equivalent of hydrogen is replaced by an organic molecule. Of the secondary and tertiary bases (imidogen- and nitrile-bases), *i.e.* the ammonias in which 2 or 3 equivalents of hydrogen are replaced, and of the fixed ammonium-bases, little more is known at present than their mode of formation and their composition.

On again taking up this subject lately, it appeared of paramount importance to search for new and, if possible, simpler methods of forming the secondary and tertiary bases.

Of the several experiments made for this purpose, on which I intend to report at another opportunity, I may be allowed even now to quote a result which appears to be capable of a more general application.

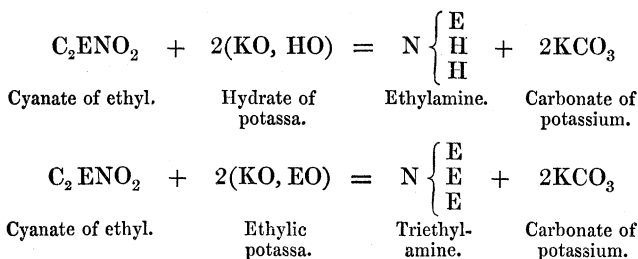
One of the common methods of preparing the amidogen-bases, consists in treating cyanic ether with hydrate of potassa, a reaction which was first observed by Wurtz. To take a special case, cyanate of ethyl, when treated with hydrate of potassa, assimilates 2 equivalents of water and splits into ethylamine, which is set free, and carbonic acid, which is fixed by the alkali. An appropriate modification of this reaction appeared to afford a means of passing directly from cyanate of ethyl to *triethylamine*. For this purpose it was only necessary to offer to the cyanate of ethyl 2 equivalents of oxide of ethyl instead of 2 equivalents of water. The action of cyanate of ethyl upon ethylic potassa appeared to involve the conditions necessary for accomplishing this result.

Experiment has fully confirmed this anticipation.

On digesting for several hours at a moderate temperature a mix-

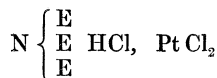
ture of pure cyanate of ethyl with pure ethylic potassa or soda (that is, absolute alcohol as far as possible, saturated with potassium or sodium), and distilling subsequently upon a sand-bath, a strongly alkaline liquid containing alcohol is obtained. Saturated with hydrochloric acid, this liquid furnishes on evaporation to dryness a residue from which a considerable quantity of *triethylamine* is expelled on addition of potassa.

The analogy of the two processes, of the formation of ethylamine and triethylamine, is obvious on glancing at the following equations.



There could be no doubt regarding the identity of the basic compounds thus formed with triethylamine. The base floating on the surface of the saturated aqueous solution, possessed in a marked manner the characteristic odour of triethylamine. In order to exclude the possibility of a mistake, the hydrochloric solution of the compound was mixed with a solution of bichloride of platinum. Only after protracted standing of the highly concentrated solution, deep orange-coloured, well-formed crystals of the platinum-salt were deposited, the physical characters of which were still fresh in my memory.

The determination of platinum furnished results closely agreeing with the formula



I have already applied this reaction in various directions, and shall communicate the results which I have obtained at a future period. On considering how frequently, in the action of hydrated potassa upon organic substances, the hydrogen of the water of

hydration is assimilated by the products of decomposition, the substitution of ethylic potassa for the hydrate appears in many cases to promise valuable results from this mode of ethylation. The facility, however, with which ethylic potassa decomposes at a comparatively low temperature, must always be a serious obstacle to an extensive use of this reaction.

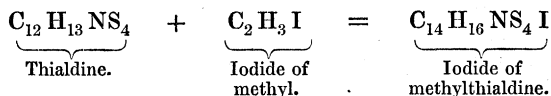
II. "Contribution towards the History of Thialdine." By
A. W. HOFMANN, LL.D., F.R.S. Received May 30, 1857.

Researches into the behaviour of several organic bases with bisulphide of carbon, which I intend to lay before the Society at a later period, have led to some experiments with thialdine, the results of which I may be allowed briefly to state, since they are but loosely connected with the principal object of the inquiry.

It appeared of interest to gain some insight into the constitution of thialdine, which is the prototype of an important class of alkaloïds containing sulphur. To what group of bases does this body belong? Is it a primary, a secondary, or a tertiary base? The favourite method of questioning bases by means of iodide of methyl promised to furnish some elucidation of this subject.

Thialdine, dissolved in iodide of methyl, to which conveniently its own bulk of ether has been added, furnishes after twelve hours a solid crystalline mass, which may be readily freed from adhering thialdine by washing with ether and recrystallizing from alcohol.

The crystalline compound produced in this manner is the iodide of a methylated base, generated, as proved by analysis, by the union of equal equivalents of the two constituents.



The deportment of the new iodide resembles that of iodide of tetramethylammonium, and the analogous iodides, which I have described some years ago. Insoluble in ether, soluble in alcohol, and precipitated from this solution by ether in the crystalline state, soluble in water with an acid reaction, and separated from it again,